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RESEARCH AID

2040

PRODUCTION OF CEMENT IN THE USSR
1945-60



CIA/RR RA-1

20 July 1955

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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(ORR Project 47.662)

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FOREWORD

Successful plan fulfillment of construction in the areas of housing, agriculture, and the light and food industry is dependent to a large extent upon the production of building materials and particularly upon the program for the production of precast concrete products. Recent measures taken to enable the building materials industry to support construction programs are discussed in CIA/RR PR-110, Significant Developments in the Soviet Building Materials Industry, 1954, 8 April 1955, SECRET. The use of precast concrete products is expected to effect savings in construction labor amounting to over one-third of the total labor force heretofore required for projects in which such products are to be used. The precast concrete program also is expected to reduce substantially the requirements for lumber and metal and to decrease the burden on the transportation system. Because of the critical importance of cement to the realization of Soviet construction goals, it is essential that the intelligence community be provided with a firm series of estimates of cement production.

The purpose of this research aid is to develop such a series of figures for production of cement in the USSR in the postwar period. There are available at present at least eight different series of figures all of which purport to show these estimates. Because all of these series disagree to some extent and none is adequately documented or explained, it is necessary to develop a series in which each figure is documented and explained. The data in this research aid are fully documented, and the methodology is fully explained.

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(ORR Project 47.662)

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PRODUCTION OF CEMENT IN THE USSR*
1945-60

Summary

Production of cement in the USSR has climbed steadily since the end of World War II. It is estimated that production in 1954 was about 19 million metric tons,** which was more than 10 times the level of output in 1945. The Fifth Five Year Plan (1951-55) indicated that production of cement should be between 21.7 million and 23 million tons in 1955, and the Soviet cement industry has a good chance of fulfilling this goal. Actual production in 1955 probably will reach about 22 million tons. If output continues to increase at the present rate, the USSR should produce about 35 million tons of cement in 1960.

Table 1 compares estimated production of cement in the USSR in 1940 and 1945-60 with US production for the same period and projects into the future present trends in Soviet cement production.

Table 1

Estimated Production of Cement in the USSR
Compared with Production in the US
1940 and 1945-60

Million Metric Tons					
<u>Year</u>	<u>USSR</u>	<u>US</u>	<u>Year</u>	<u>USSR</u>	<u>US</u>
1940	5.8	22	1953	16.0	N.A.
1945	1.8	17	1954	19.0	46
1946	3.3	28	1955	22 <u>a/</u>	
1947	4.7	32	1956	24 <u>a/</u>	
1948	6.4	35	1957	27 <u>a/</u>	
1949	8.1	35	1958	30 <u>b/</u>	
1950	10.0	40	1959	33 <u>b/</u>	
1951	12.0	41	1960	35 <u>b/</u>	64
1952	14.0	42			

a. Margin of error: plus or minus 10 percent.

b. Margin of error: plus or minus 15 percent.

* The estimates and conclusions contained in this research aid represent the best judgment of ORR as of 1 May 1955.

** Throughout this research aid, tonnages are given in metric tons.

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I. Introduction.

Efforts to modernize the construction industry of the USSR have resulted in an increasing emphasis on the production of cement. As the USSR attempts to convert its construction industry from a rather backward, labor-consuming industry to a modern, mechanized industry, the availability of cement will become even more important than it is now.

The dependence of the construction industry upon this key commodity is illustrated by the decrees concerning the use of pre-fabricated, reinforced concrete. These decrees represent an attempt by the USSR to bolster the construction industry without placing additional strains on other sectors of the economy. The construction industry bears the largest burden of the Soviet plans to expand the productive capabilities of heavy industry and agriculture, but it must have adequate supplies of materials available to carry out its job. The plans for expansion inextricably involve the cement industry because Soviet leaders are depending upon the expanding production of cement to supply the construction industry with the means of fulfilling its task of broadening the bases of industry and agriculture.

Development of the cement industry by region and industrial area will greatly alleviate some of the heavy requirements placed on the heavily burdened transportation system. An important reason for decreasing the use of concrete and precast concrete products instead of timber products is the difficulty faced by the transportation system in moving adequate quantities of timber from the area of origin to the consumer.

As the population of the USSR continues to increase, especially in urban centers, housing will continue to be a problem of major proportions. The solution of this problem is a primary responsibility of the construction industry. Numerous widely publicized Soviet announcements indicate that the probable solution will depend upon the ability of the construction industry to build housing relatively quickly and cheaply by using standardized, precast concrete components. The solution to the housing problem also will depend upon the ability of the cement industry to supply the basic raw material.

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II. Rate of Increase of Production.

Table 2 shows the annual percentage increase in production of cement in the USSR for each of the postwar years as compared with the preceding year.

Table 2

Annual Percentage Increase in Production of Cement
in the USSR
1946-54

<u>Year</u>	<u>Percentage Increase over Preceding Year ^{a/}</u>
1946	85
1947	40
1948	37
1949	26
1950	26
1951	19
1952	15
1953	15
1954	19
<hr/>	
a. <u>1/</u> *	

One difficulty in estimating Soviet production of cement is the fact that it is necessary, in order to calculate actual production from the series of figures in Table 2, to have an absolute production figure for at least one of the years. Presumably, many of the differences in the existing estimates of production of cement can be explained by the choice of various absolute figures.

A second reason for the variations in estimates is the fact that the Russians use only two significant figures in reporting the increase in production of cement. For example, the increase in 1953 over 1952 is reported as 15 percent, which presumably implies an

* For serially numbered source references, see the Appendix.

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increase of 14.5 to 15.5 percent. If the low figure were taken for each of the years, production in 1953 would be 8.6 times that of 1945. If the high figure were taken, however, production in 1953 would be 9.14 times that of 1945.

III. Derivation of Absolute Figures from 1950 to 1953.

A range for 1950 production of cement can be derived from statements in the Soviet press that in 1951 the cement industry produced 2 million tons more cement than in 1950. 2/ Production in 1951 was 19 percent greater than in 1950.* Thus 2 million tons should equal 19 percent of 1950 output. The figures given imply, however, that the increase could have been anywhere from 18.5 to 19.5 percent and that the absolute increase could have been anywhere from 1.5 million to 2.5 million tons. Using these extreme figures, production in 1950 could have been anywhere from 7.7 million to 14 million tons. If the 2-million-ton figure is regarded as containing 2 significant figures (implying a range from 1.95 million to 2.05 million tons), the possible range for 1950 production is from 10 million to 11.1 million tons. The Soviet practice of giving 2 or 3 significant digits in announcements concerning plans and plan fulfillment lends support to the belief that the absolute increase was much closer to 2 million tons than to 1.5 million or 2.5 million tons.

Other available data narrow the range for 1950 production of cement still more. The Fourth Five Year Plan (1946-50) anticipated production in 1950 of 10.5 million tons of cement. 3/ The Fourth Five Year Plan for cement was stated to have been fulfilled by 101 percent by enterprises of the Soviet Ministry of the Construction Materials Industry and by 97 percent for the USSR as a whole. 4/ Total production in the USSR in 1950 must therefore have been approximately 97 percent of 10.5 million tons. This figure is only approximate, because the Plan could have been fulfilled anywhere from 96.5 to 97.5 percent. Using this range (96.5 to 97.5 percent), 1950 production must have been somewhere between 10.1 million and 10.2 million tons.

A third absolute figure for the period was supplied by a Soviet statement that total production of cement in 1953 was "more than 16 million tons." 5/ It is difficult to determine the exact range that should be applied to this figure.

* See Table 2, p. 3, above.

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Assuming that production of cement in 1950 must have been between 10.1 million and 10.2 million tons and assuming that annual increases as shown in Table 2 are accurate, it is possible to calculate production of cement for all of the years from 1945 to 1954. Because the exact level of production in 1950 is not known and because the annual increases are given only to three significant figures, the production figures all have a range. Table 3 shows the estimated production of cement in the USSR in 1940 and each of the years from 1945 to 1954, with the appropriate range. The year 1940 is included for purposes of comparison.

Table 3

Estimated Production of Cement in the USSR
1940 and 1945-54

<u>Year</u>	<u>Production a/ (Million Metric Tons)</u>	<u>Margin of Error (Percent)</u>
1940	5.8	
1945	1.8	
1946	3.3	
1947	4.7	
1948	6.4	
1949	8.1	
1950	10.0	+2 to 0
1951	12.0	+1.7 to 0
1952	14.0	+0.7 to -0.7
1953	16.0	+1.9 to 0
1954	19.0	+2.7 to 0

a. Data rounded to two significant figures.
For derivation, see the Appendix.

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S-E-C-R-E-TV. Estimated Future Production.

Future production of cement can be predicted with any degree of confidence only after thorough analysis of such factors as utilization of existing capacity, plans for future expansion of the industry, manufacture of equipment for the cement industry, exports and imports of such equipment, and probable future demand for cement as indicated by investment in and plans for development of a precast concrete program, construction of housing, irrigation projects for agricultural development, and other cement-consuming programs. Because of the large number of variable factors involved, predictions of future performance, even when based on the most complete information, must be regarded as indicative only of probable general trends. This is especially true of cement because the data on which such predictions should be based are far from complete.

All available evidence indicates that definite Soviet plans exist for continuing the current trend of expanding production of cement until 1960 or later. There is no certain evidence to support specific estimates for specific years. There is evidence, however, to support the estimates in Table 4.

Table 4

Estimated Future Levels of Production of Cement
in the USSR
1955-60

<u>Year</u>	<u>Production (Million Metric Tons)</u>	<u>Estimated Margin of Error (Percent)</u>
1955	22	± 10
1956	24	± 10
1957	27	± 10
1958	30	± 15
1959	33	± 15
1960	35	± 15

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The bases of these estimates are as follows:

1. 1955.

It is probable that production of cement in 1955 will lie somewhere between 21 million and 24 million tons. Data for the years 1945-54 fall along a second-degree parabolic curve. Projection of the lower and upper limits of data for those years* as a second-degree curve would result in estimates of 21 million and 22 million tons. The Fifth Five Year Plan announced that production of cement in 1955 was to be 2.2 times production in 1950. This would indicate a 1955 production of from 21.7 million to 23 million tons per year. A statement was made in the Soviet press in January 1955 to the effect that production of cement would increase 22 percent over 1954. 6/ If this plan is met, it would mean a production of from 23 million to 24 million tons. The range of 21 million to 24 million tons indicated by these various methods apparently is quite possible.

2. 1957.

It seems reasonable that, by 1957, production of cement should be somewhere in the neighborhood of 26 million to 29 million tons. At the Builders' Conference in December 1954, Khrushchev stated that output of cement in 1957 should be 1.5 times that of 1954. This expectation of 1.5 times 1954 production could mean anything from 27.5 million to 30 million tons. Projection of the lower and upper limits of data for 1945-54 as a second-degree parabolic curve results in estimates for 1957 of 26.6 million and 27.4 million tons.

3. 1960.

A range of 30 million to 40 million tons is a reasonable estimate for the production of cement in 1960. The Minister of the Soviet Ministry of the Construction Materials Industry stated that it would be necessary "to build and put into operation 28 large cement plants and start construction of still another 20 factories during the next 5 years." 7/ On the basis of the date of the speech and the context of the quoted sentence, it is apparent that the first 28 plants are planned for completion by 1959. If 6 of the additional 28 plants are completed by 1960, production in that year should be increased by a

* See Table 3, p. 5, above.

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minimum of 10 million tons* over 1954. An increase of this size would mean that production in 1960 would amount to at least 29 million tons. Increases in production from existing plants based on increased labor productivity, improved equipment, and development of new methods are being stressed. Additional production increments can therefore be expected.

Another indication of the level of production which Soviet planners expect to achieve by 1960 is given in a statement made by Kaganovich on 8 May 1954 that "by 1960 cement hauling by rail would increase 100 percent over the level of 1953." The term "hauling by rail" is ambiguous. It cannot be determined whether the term means that the number of tons loaded will double or whether the number of ton-kilometers of cement hauled will double. The latter seems more probable. If "tons hauled" does mean ton-kilometers, it implies more than a 100-percent increase in production, as the increased number of plants would almost certainly result in a reduction of the average length of haul. An increase of 100 percent over 1953 production would mean a 1960 production of approximately 32 million tons. Significant reduction of the average length of haul would mean that 1960 production would be well over 32 million tons.

Projection of the second-degree parabolic curves for 1945-54 data results in estimates for 1960 of 36 million and 37 million tons. Obviously an estimate based solely on such a projection would be highly questionable, for if carried far enough into the future, such a curve would ultimately imply infinitely large production. Because 1960 still falls in the gradually increasing portion of the curve, however, and because other data indicate that the point at which production can be expected to level off is not anticipated by 1960, this method affords another means of determining the general trend in 1960.

There are some indications that 300,000 tons is an extremely conservative estimate of the annual production to be expected from large plants under construction. An average production of 400,000 tons and completion by 1960 of the second group of 28 plants mentioned by the Minister of the Soviet Ministry of the Construction Materials Industry could easily result in an excess of 40 million tons in production for 1960.

* The average large cement plant in the USSR has an annual production of approximately 300,000 tons. It is also known that one plant to be installed in the near future has a single-kiln capacity of 1,200 tons per day, or about 400,000 tons per kiln per year. Most Soviet cement plants are three-kiln installations.

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In the light of all of the above factors, a range of 30 million to 40 million tons is believed to be a reasonable production estimate for 1960.

4. 1956, 1958, and 1959.

No Soviet statements are available which provide a basis for estimating production for the years 1956, 1958, and 1959. The second-degree parabolic curves yield the following estimates for these years: 1956, 23.8 million and 24.5 million tons; 1958, 29 million and 30 million tons; 1959, 32 million and 34 million tons. These must be regarded as point estimates within ranges, not as ranges which necessarily will bracket the most probable estimates. These estimates taken in conjunction with those already made for 1955, 1957, and 1960 resulted in the estimates which appear in Table 4, above. The exact figures were selected because they afford a fairly even progression from point to point toward the 1960 estimate. Margins of error affixed to estimates for these years reflect the margins of error attached to figures on either side of them and are sufficiently wide to allow for being off 1 year in the schedule of increasing production.

VI. Production in the US.

For purposes of comparison, Table 5 shows production of cement in the US in 1940 and 1945-60. The estimates for 1960 are based on estimates of the US Bureau of Mines.

Table 5

Production of Cement in the US
1940 and 1945-60

Million Metric Tons			
<u>Year</u>	<u>Production</u> ^{8/}	<u>Year</u>	<u>Production</u>
1940	22	1953	N.A.
1945	17	1954	46
1946	28	1955	
1947	32	1956	
1948	35	1957	
1949	35	1958	
1950	40	1959	
1951	41	1960	64
1952	42		

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APPENDIX

SOURCE REFERENCES

Evaluations, following the classification entry and designated "Eval.," have the following significance:

<u>Source of Information</u>	<u>Information</u>
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

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Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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1. 1946: Pravda, 21 Jan 47, U. Eval. RR 1.
 - 1947: Ibid., 18 Jan 48, U. Eval. RR 1.
 - 1948: Ibid., 20 Jan 49, U. Eval. RR 1.
 - 1949: Ibid., 18 Jan 50, U. Eval. RR 1.
 - 1950: Ibid., 26 Jan 51, U. Eval. RR 1.
 - 1951: Ibid., 29 Jan 52, U. Eval. RR 1.
 - 1952: Ibid., 23 Jan 53, U. Eval. RR 1.
 - 1953: Ibid., 31 Jan 54, U. Eval. RR 1.

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2. [REDACTED]
3. Pravda, 21 Mar 46, U. Eval. RR 1.
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5. [REDACTED]
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